STUDIES ON THE BEHAVIOR OF THE GREAT HORNED OWL

BY PAUL L. ERRINGTON

This paper is written on the basis of observations and experiments made during three years (1929-1932) of wild life study in south-central Wisconsin, in which the Great Horned Owl, *Bubo virginianus*, was given rather special attention. It should be admitted, however, that data on behavior were acquired incidentally, the primary purpose of the work being food habits research.

Let us begin with the nestling owlet. My own data have to do with twenty-nine Wisconsin horned owl nests, twelve of which were visited regularly. Of juveniles from the latter, ten were kept tethered to prolong the food habits studies (see Errington, Paul L., Technique of raptor food habits study. The *Condor*, Vol. XXXIV, March-April, 1932, pp. 75-86) some months past the time when they would have flown. In addition, work was done with six captive juveniles, including four birds hand raised from more or less early stages.

The first two weeks in the young horned owl's life have a singularly profound effect upon its future disposition. Recently hatched owlets accustomed to no source of food other than their human attendants came to recognize them somewhat as they would their own parents, even displaying what appeared a great deal like true affection. On the other hand, an owlet reared by its parents through approximately one-fourth of its growth never did really tame, though it tolerated discreet handling. Two juveniles captured shortly before they could fly remained untamable; the nearest they ever came to a compromise with the enemy was to approach for food when forced by hunger—and then only with the most obvious of misgivings.

Hand reared juveniles fed only dead prey were at the age of several months still very helpless, to all appearances quite devoid of active killing instinct. Upon the release of live English Sparrows into the cage of one such owl, it regarded the sparrows with evident curiosity and eventually made a series of clumsy, futile hops in their direction. Handed a live sparrow, the owl reached out and took it, held it gently in its talons while looking it over, and finally let it slip away, uninjured. The raptor then came to me and started tugging at my finger for something to eat. Ultimately this bird learned to kill and eat sparrows left in the cage overnight, but not until many months old and in full adult plumage could it be taught to kill larger prey. Parallel experiences were had with another Horned Owl and with a Barred Owl similarly raised.

The owlet taken when about a quarter grown was best for experimental purposes. It was neither so tame as to be a spoiled pet nor so wild as to react unnaturally in captivity. It would permit of no familiarities but was not hostile. It was merely "its own owl", and matters progressed smoothly as long as the inviolability of its person was respected.

Sparrows were admitted into the cage of this bird when it had attained adult size; it made catches from the beginning, improving steadily in skill with practice. Live Norway rats were then tried, which the bird killed with ease. A medium-sized Belgian hare was not attacked (May 18, 1930) nor was a guinea pig (June 1). The guinea pig, moreover, by frantic efforts to escape and possibly by its alien strangeness, frightened the owl into flying up and clinging to the wire of the cage top. For days the demoralized raptor would not attack even the rats which it had previously handled with facility. Five days of fasting (June 21 to 26) were required to force this bird into killing its own food again, rats being turned into the cage at intervals during this time. On July 7, it was fed, banded, and freed in a suitable woodlot about a mile south of Madison. It was shot four miles east of the city by a hunter, December 20.

One of the wild grown juveniles struck and killed a fifth-grown cottontail rabbit on its first attempt (May 25, 1930). The owl started at once to tear off pieces from the victim's head and to swallow them. Thus, without past experience, this wild creature did what was to be done, if a trifle crudely, which may be contrasted with the ineptness of pets that couldn't do so well several months later. Rats were taken care of with equal effectiveness and more precision, but the darting guinea pig likewise drove this bird up on the wire (June 1). As in the other case, the guinea pig incident ruined the confidence of this owl as a killer. Thereafter (up to June 17), it too was afraid of the rats which should have given it no alarm. Especially was this true of rats that advanced; rats that retreated stood an infinitely better chance of finding an owl on top of them.

The hand-reared horned owls did not become really wild as long as they were dependent upon man for food—at least for twenty months, which is the longest that I have information on a single individual. They became cross and excitable as they matured, nevertheless, and resented more and more any liberties taken with them. The two tamest of my experimental birds at the age of four months would be likely to draw blood if picked up carelessly, largely I think as an unintentional consequence of increased strength. Subjected to what

they seemingly felt indignities, they pinched and grasped with beak and talons in a rough but not vicious manner; that is, their defense inflicted pain but not injury. The two did not change much after four months save to become more irritable and to lose a little—incredibly little—of their helplessness.

The experimental work gave rise to sundry opinions as to what would happen if the tame owls ever got away. Partial enlightenment was forthcoming in a couple of instances. A juvenile about three months old escaped to fly from tree to tree and to alight on a lawn more than a quarter mile away. There it sat, apparently bewildered. Upon noticing my approach, it came to meet me on foot. The other instance concerned two owls (aged six and nineteen months) kept in a small building which was broken open one night by human marauders. Morning came, and the oldest bird was waiting inside, despite the open door. The youngest was gone. On the third day the young man who was caring for the captives heard the familiar call of a hungry juvenile Horned Owl in a woods near by. As he came within fifty yards or so of the woods, an owl sailed out, flew directly toward him, and lit at his feet to be picked up.

Although horned owls as a rule seemed to show an underlying uniformity of behavior, the temperaments of some birds were noted to differ considerably.

To illustrate: Of the ten tethered juveniles, eight characteristically sought escape by flight at each visit during the gathering of food habits data. One employed a definite sequence of hiding, flight, and offense tactics; first, it would conceal itself by "freezing" at the base of the tree to which tethered; then, it would endeavor to take wing; and, last, it would attack. The tenth rarely sought to hide or fly but would await visitors in plain sight, scowling sourly, and requiring only that human legs be within range of the tether chain before it would arrive in all sincerity, eight talons and beak.

This latter youngster was the only one of the tethered ten that ever learned to adapt itself to my semi-weekly visits. It learned to leave me alone if I left it alone, but at the least hint of overt intent on my part, it would be at me, the embodiment of utter ferocity. This juvenile, the most savage with which I have had dealings, happened to be of the same brood as the most helpless and innocuous pet owl I have known.

Nesting studies brought out temperament differences in adult owls, also. Altogether, I have had sufficient intimate relations with adults from twenty nests to speak positively. Parents from eleven would

keep at a distance, sometimes being visible through the trees 150 to 200 yards off, but usually in a position to see, if unseen themselves. At any rate, this is the impression I gained from hearing faint though eloquent hooting deeper in the woods. Nine sets of parents would "talk" and snap their bills from trees within fifty yards of the nest, these birds being in sight most of the time. Three nests were dangerous to visit alone, on account of the old birds attacking. I have twice been badly lacerated by adults defending their young, to say nothing of the occasions I have saved my skin by dodging or by waving off assaults. The presence of a second person completely discouraged actual attacks.

In general the parents displayed the most solicitude toward their young about the time that the latter were ready to leave the nest. This was the culmination of attachments which appeared quite loose prior to the hatching of the eggs. The old birds, too, would fly off and leave downy owlets just out of the egg without apparent reluctance. As the owlets grew, the parents tended to remain more in the immediate environs in the event of disturbances. Usually one of the birds stayed much closer—presumably the female—though sometimes both would perch in the same tree or even on the same limb. Their nearness was directly proportional to the nearness of the investigator to the young; when he was up in the nest, the old ones not infrequently came to the next tree; as he descended they made off into the woods; if he ascended again, they returned.

As parental attachment reaches its height, the adults will often go to any lengths within their physical powers in behalf of their young, even to the extent of flapping on the ground as if crippled. This I have witnessed three times, twice (on consecutive years and in the same woodlot) by what I believe to be the same owl. A more ridiculous sight than a perfectly functional horned owl simulating a broken wing is difficult to imagine. In all three instances in which I observed the broken wing trick to be employed, the crazed parents had first tried everything else in their repertoire; the rarity of this sort of performance—in my experience, at least—is possibly indicative of instincts now hardly more than residual from early avian phylogeny.

Parental obligations to nestlings seem fulfilled for the most part by protection against interlopers and by making available a certain amount of food. The feeding relations of old to young appear on the whole to be indiscriminate. The owlet that gets fed is the one that wants the food and takes it. If the last owlet to hatch from a

clutch of eggs is able to feed regardless of the competition of its stronger nest-mates, it lives; otherwise it is neglected and dies.

Attempting to gain further insight into horned owl family life, I once placed in a nest containing two large juveniles a tame youngster of corresponding age (April 24, 1930). The old birds apparently accepted the stranger without much ado, for the latter was seen to be completely at home the next visit (April 26). May 4, all three juveniles, now ready to fly, were sitting together, looking over the edge of the nest.

The intensity of parental devotion toward the tethered owls was on the wane by June, and this doubtless applies to the free juveniles, now capable flyers. Adults attending two tethered juveniles successfully kept late into the season of 1931 were slackening in their duties still more by the middle of July, but continued to bring food until release of the young, August 8. There was no doubt, nevertheless, that the food was being brought in diminishing quantities coincident with the "weaning" of the free juveniles, the hungry calling of which could be heard throughout almost any occupied woodlot.

The obvious deduction is that the species will look after its young just about so long in accordance with inherent reproductive mechanics. The length of the feeding period of young by adults does not, then, seem correlated with the variable individual needs of the young as affected by circumstances. The "weaning" of mid-summer culminates the protracted juvenile education, whether, it may be presumed, the young have learned to hunt or not.

One of the best observations I have been able to make on "weaning" had to do not with horned owls but with screech owls. In this case (July 5, 1932; Ruthven, Iowa), three young and an adult were watched for a time between sunset and dark. The family was feeding on some sort of insects, the identity of which could not be made out in the dusk. The young swooped frequently, with more or less success. When followed to successive perches by a mendicant youngster, the old bird took flight again.

From scattered, fragmentary bits of data a reasonable inference can be drawn that the adult owls by indifference and maybe by punishment gradually compel their troublesome progeny to shift for themselves. I am convinced that no normal juvenile horned owl fails to take advantage of family support as long as such is to be had. When deprived, it does what it has to.

Where does the juvenile go, after it takes up a wholly independent existence? Of thirteen horned owl nestlings (birds that had never been tamed, tethered, or experimented with in any way to reduce their prospects for survival) personally banded in 1930 and 1931, three were reported shot within a year or so, all at points thirteen to twenty miles of where banded. Similarly scanty data from banded nestling barred owls bear out the belief that the young of resident large owl species, generally, take up quarters a considerable distance from their natal woodlots. This wandering furnishes an explanation for the numbers of horned owls caught seasonally by pole traps on some game farms and hunting club properties.

Conversely, there is good though not indubitable evidence that the Wisconsin adults studied tended to stay from year to year in the same territory. Unfortunately, I have nothing as definite as banding data on adults upon which to base conclusions. I have merely observed in a few instances distinctive behavior on the part of owls seen in woodlots on consecutive years and also continued partiality for certain nest sites not intrinsically of exceptional attractiveness.

For late summer and early autumn, data on horned owl behavior have been virtually unobtainable until the falling of leaves lessened the cover value of deciduous woods. The owls' choice of daylight hiding places restricted to a comparatively limited number of trees still retaining leaves or those draped with vines or otherwise adequate, their retreats may then be better located. It proved extremely difficult —virtually impossible—to make direct observations on the owls themselves, except by flushing the birds, to confirm the fact that certain places were being used; the main reliance was placed on reading of fresh signs about the roost.

Prior to 1932, it was noted casually that horned owls were apt to station themselves in the fall in the near neighborhood of old stick nests (hawk or crow) which they would appropriate in the spring. During the season of 1931-1932 this was checked up more carefully. In the late fall, 1931, five horned owl territories were discovered in regular use (judged by birds seen and by accumulations of feces and pellets beneath roost trees), of which four proved to be nesting areas. Three other nesting areas, not actually visited in the fall, betrayed by old pellets their early occupancy. Exception: one pair did not move into their nesting territory until January or later, though breeding was not delayed, as incubation had started by February 21, 1932.

None of the twenty-nine 1930-1932 Wisconsin horned owl nests upon which personal data were procured showed evidence of having been built or remodeled to any degree by the strigine occupants. In practically every case the owls' nest-making instincts seemed satisfied by cleaning out the debris from the immediate bottom of the nesting place and by lining the same with variable quantities of breast feathers. Nest sites chosen were: red-tailed hawk nests, thirteen; crow nests, eight; hollow trees, three; unidentified stick nests, two; holes or crevices in rock faces, two; fox-squirrel nest, one. Nests taken over were usually in secluded locations, the prospective occupants requiring mainly privacy and convenience; in other respects the birds displayed very limited judgment in selecting nests, as four were of such flimsy construction that they disintegrated during the storms or from use, to dump eggs or owlets on the ground.

It is true that the precipitation of an owlet from a crumbling nest is not necessarily an event of dire consequence to the species. If the owlet is of fair size, it can lessen the violence of its fall by spreading its part-grown flight feathers; if it is not this far fledged, it may still be sufficiently tough to withstand a comparatively terrific impact. Even young horned owls are put together to stay.

Once on the ground, if the owlet is too small to move with facility, it will stay about where it fell and will come to regard that spot as its proper nest, though it may be situated in the middle of a snow bank. Owlets from two nests, reared on the ground from early in their development, assumed the usual defense attitude upon the approach of a man but up to a certain size or age limit made no attempt to leave, as did those of corresponding advancement finding themselves in unfamiliar surroundings. Fallen owlets large enough to get along well on the ground promptly moved off in almost any direction. These wanderers were usually to be located hiding at the base of trees twenty to two hundred yards from the original nests. Moving or remaining stationary, the owlets are cared for by the old birds; since the adults are both faithful providers and formidable protectors, it may make scant difference in the end whether the young spend their full time in the nest or not.

At any rate, there is little question of the horned owl within its geographic range being a successful species under ordinary wilderness and backwoods conditions and in some settled communities. Essen-

tially a bird of low intelligence, it is equipped with a set of stereotyped behavior patterns, effective nevertheless in enabling it to take care of itself generally, except when confronted by novel emergncies or those racially recent. While the horned owl does learn, it learns with difficulty proportional to the remoteness of the new experience from its regular life routine. It exhibits, too, a ponderous adaptiveness by which it sometimes lives in environments as diverse as the buckbrush patches of treeless plains and the suburbs of cities.

In the face of man's persecution its survival is perhaps attributable as much to its secretiveness as to any single factor aside from accidentally favoring circumstances. To the pole-trap it has no answer, nor to the shooting of its young from its nests, nor to the destruction of its environment. It has but the one refuge—sometimes adequate, sometimes not—from the complex perils arising through man and man's enmity. It simply keeps out of sight.

A study of the food habits of the horned owl re-emphasizes the same mechanistic undercurrent conspicuous elsewhere in the species life history. Its food habits as a species are governed by where it is, by what it has access to (see Errington, Paul L., Food habits of southern Wisconsin raptors, Part I—Owls. The *Condor*, Vol. XXXIV, July-August, 1932, pp. 176-186). One can expect practically any animal within its habitat and of a size within its power to handle to be represented in the diet of the Great Horned Owl; exempt only are species the habits and adaptations of which do not leave them vulnerable. Commonly taken are the more nocturnal animals such as rabbits, flying squirrels, rats, mice, skunks, weasels, shrews, small owls, large insects; and more occasionally diurnal forms handicapped by darkness, i. e., poultry, grouse, flickers, meadowlarks, many small birds, fox-squirrels, chipmunks, etc.

From the examination of some 1900 pellets I feel justified in saying that choice plays a minimum role in the horned owls' routine hunting. The horned owl presumably goes out with the intention of getting something to eat, to take what it encounters first and is able to get. The victim is usually a rabbit, for the apparent reason that rabbits are conspicuous, more or less abundant, and easily obtainable. They are large and satisfying and may serve for several meals. Conceivably, the individual owl may recognize somewhat the superiority of the rabbit as prey and be influenced in its hunting thereby, but

other forms likewise highly available will not be overlooked. The horned owl is not particular when it wants to eat. Even carrion is not unacceptable. I knew a horned owl to feed on a skinned cow carcass when the surrounding woods held plenty of cottontails (March, 1931).

When the captive horned owls had eaten they were satisfied, though extraordinary availability of prey would tempt them to kill more than they needed at the time. Living prey by its movements in proximity to feeding owls diverted the latters' attention from killed food already in possession and so invited attack, which did or did not materialize. The reaction, as observed in experiments with horned owls and English Sparrows, seemed wholly reflexive, in no way suggesting any particular enjoyment of killing on the part of the predators used.

In the wild, killing in excess of immediate needs is indicated by the occurrence now and then of two heads of medium-sized individuals of prey in the same pellet. This does not appear to happen often, however, except during the nesting season when the adults must bring in more food than they themselves require, either for the owlets directly or in anticipation of the hatching of the eggs. The evidence from fall and winter pellets shows that horned owls are prone to eat all or nearly all of a given kill. For example, bones of some prey species so exceptional that they could reasonably belong only to the identical individual may be present in two or more pellets from a certain owl.

Broadly, the horned owl is a simple creature of simple needs. It has physical and psychic qualities of positive, neutral, or negative survival value. Its nocturnal habits and silent approach give it a distinct advantage over many types of prey; these, combined with the might of its talons compensate greatly for its inflexibility of behavior. Where the direct and indirect pressure of man is heavy against the species, its natural endowments may not suffice. But whether it thrives or declines, the species will doubtless continue to respond to the vicissitudes of its existence in much the same manner one may suppose it always has, living if it can, because it can.

Iowa State College,
Ames, Iowa.